

# Lunar Meteoroid Impact Observations and the Flux of Kilogram-sized Meteoroids

Robert M. Suggs<sup>1</sup>, William J. Cooke<sup>1</sup>, Heather M. Koehler<sup>1</sup>, Danielle E. Moser<sup>2</sup>, Ronnie J. Suggs<sup>1</sup>, and Wesley R. Swift<sup>3</sup>

<sup>1</sup> NASA Marshall Space Flight Center, Huntsville, AL 35812

<sup>2</sup> Stanley Inc., Huntsville, AL 35812

<sup>3</sup> Raytheon/MSFC Group, Huntsville, AL 35812

rob.suggs@nasa.gov

Lunar impact monitoring provides useful information about the flux of meteoroids in the tens of grams to kilograms size range. The large collecting area of the night side of the lunar disk, approximately  $3.4 \times 10^6 \text{ km}^2$  in our camera field-of-view, provides statistically significant counts of the meteoroids. Nearly 200 lunar impacts have been observed by our program in roughly 3.5 years. Photometric calibration of the flashes along with the luminous efficiency (determined using meteor showers<sup>1,2,3</sup>) and assumed velocities provide their sizes. The asymmetry in the flux on the evening and morning hemispheres of the Moon is compared with sporadic and shower sources to determine their most likely origin. The asymmetry between the two hemispheres seen in Figure 1 is due to the impact rate and not to observational bias.

Comparison with other measurements of the large meteoroid fluxes is consistent with these measurements as shown in Figure 2. The flux of meteoroids in this size range has important implications for the near-Earth object population and for impact risk for lunar spacecraft.

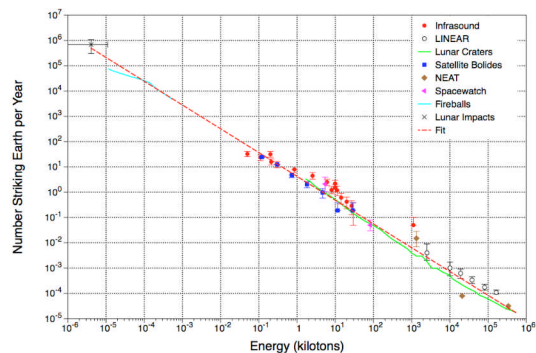
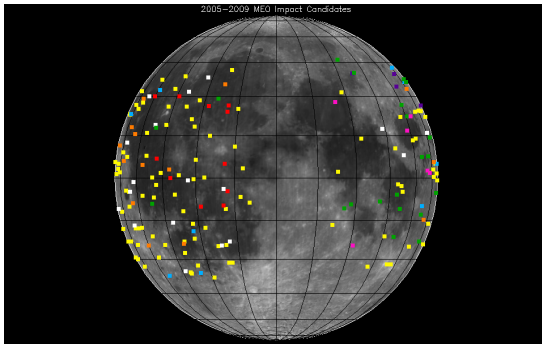


Figure 1. Distribution of observed lunar impact flashes. Figure 2. Flux determined by various techniques.

<sup>1</sup> Bellot Rubio, L.R., Ortiz, J.L., Sada, P.V., *Astrophys. J.*, 542, L65 (2000)

<sup>2</sup> Swift, W.R., Moser, D.E., Suggs, R.M., and W.J. Cooke. *Meteoroids 2010*, Breckinridge, Colorado (2010).

<sup>3</sup> Moser, D.E., Suggs, R.M., Swift, W.R., Suggs, R.J., Cooke, W.J., Diekmann, A.M., and H. McNamara. *Meteoroids 2010*, Breckinridge, Colorado (2010).